

Data Management at Scale

collection, measurement and analysis

An infrastructure segment of tools – something that needs to be done but not widely focused on

Needs

- **Trace type Data the big gorilla in the room-**
- Collection approach to reduce data – be selective
- Collect/Send at thread level
 - at any time (not only at end of execution)
- Transport approach/tools
 - Reduce IO / parallel streams
 - Parallel write
 - Parallel read – independent of run size
- Efficient approach/infrastructure for analysis (data format, DB?, post processing, on-line processing)

Collective areas of opportunity

Collection

- Aggregation
- Send all data
- Selective collection
- data packaging
- pre-processing
- flushing data
- layout of data
- wavelets

Transport

- single file writes
- custom writes – aggregate at rank 0
- MRNet
- sion lib
- PLFS
- MPI IO

Data Analysis

- data format
- file format
- use of data base
- post processing

Collection processing

There are unique approaches – some examples

- Preprocessing
- OI/SS – Save to /tmp – flush at predetermined threshold size for data type, XDR blobs sent
- Wavelet
- Collect and send all data, may focus on single rank to send
- Selective collection through various processes
 - (Cray) 2 pass, 1st simple – user can see, 2nd file with list of functions that can be configured. This used to re-instrument the run with increased focus and data collected
- Other

Transport

Various options

- Sionlib – library to write single file, need to read data
- PLFS – parallel log structured file system
- Stream through MRNet
- Custom writes (rank 0), some offset approaches
- Individual writes – post process to combine
- Parallel MPIIO
- Other

Data Analysis

- Is there a good layout for data on the file system
 - Reduce data requirements
 - Flexible analysis
 - Large scale of data
 - Use of databases, sqlite, others
- How does it look or is used by the **tool** being used for analysis
 - Preprocessed raw data
 - Impact of lossy compression, accuracy
 - What data is being collected for various types of collections
 - Use of MPI process to support analysis of data

Forward

- Interest in comparing notes – need to take inventory of approaches, pros and cons
- Need some empirical tests to assess flexibility, scalability and performance
- Deeper discussion on data formats for analysis (we didn't dive into this topic)